

527 | 11 | 0
Views | CrossRef citations to date | Altmetric

Articles

The effect of implant design of linked total elbow arthroplasty on stability and stress: a finite element analysis

Ryan Willing ✉, Graham J.W. King & James A. Johnson

Pages 1165-1172 | Received 04 Dec 2011, Accepted 09 Oct 2012, Published online: 22 Nov 2012

🗨️ Cite this article 🔗 <https://doi.org/10.1080/10255842.2012.739161>



Sample our
Physical Sciences
Journals

>> **Sign in here** to start your access
to the latest two volumes for 14 days

📄 Full Article 📊 Figures & data 📖 References 🗨️ Citations 📊 Metrics

📄 Reprints & Permissions

Read this article

Share

Abstract

Several linked total elbow arthroplasty designs exist, which function similar to a loose hinge joint. Constraint behaviour is an important design consideration, as it affects joint stability, or how much secondary [e.g. varus-valgus (VV)] motion is permitted. Implant durability is also a concern, as bearing failures have been reported. This finite element analysis investigates the constraint characteristics and ultra high molecular weight polyethylene bearing stresses of three linked elbow design concepts [cylindrical (CY), hourglass (HG) and concave cylinder (CC)]. The bearing of the CY design was subjected to elevated Von Mises stresses (2.1–5.4 times higher than the HG and CC designs) due to edge loading. The HG design maintained low stresses, but was unable to provide

consistent VV stability. The CC design also maintained low stresses while providing consistent VV stability. These results suggest that CC designs may provide better stability characteristics and durability in vivo, compared to the other two designs.

Keywords::

- linked total elbow arthroplasty
- implant design
- finite element analysis
- implant stability
- implant durability

Acknowledgements

The first author was supported in part by the Joint Motion Program – A CIHR Training Program in Musculoskeletal Health Research and Leadership.

Related research

People also read

Recommended articles

Cited by
11

Information for

[Authors](#)

[R&D professionals](#)

[Editors](#)

[Librarians](#)

[Societies](#)

Opportunities

[Reprints and e-prints](#)

[Advertising solutions](#)

[Accelerated publication](#)

[Corporate access solutions](#)

Open access

[Overview](#)

[Open journals](#)

[Open Select](#)

[Dove Medical Press](#)

[F1000Research](#)

Help and information

[Help and contact](#)

[Newsroom](#)

[All journals](#)

[Books](#)

Keep up to date

Register to receive personalised research and resources by email



Sign me up



Copyright © 2026 Informa UK Limited [Privacy policy](#)

[Cookies](#) [Terms & conditions](#) [Accessibility](#)

Registered in England & Wales No. 01072954
5 Howick Place | London | SW1P 1WG



Taylor & Francis
by **informa** •••